

## Solutions

- ① Recall:  $E(x)$  is just another name for  $\mu$ .

From calculator:

$$E(x) = 1.011$$

$$\sigma \approx 3.548$$

- ②  $E(x) = 11.0071$      $\sigma \approx 1.992$

③

X	Outcome	# Outcomes	P(x)
0	2 non-♥	$39C2$	0.559
1	1 ♥ and 1 non-♥	$13C1 \times 39C1$	0.382
2	2 ♥	$13C2$	0.059

$$\text{Total} = 52C2$$

④

X	Outcome	# Outcomes	P(x)
0	3 short	$5C3$	0.022
1	1 long and 2 short	$10C1 \times 5C2$	0.220
2	2 long and 1 short	$10C2 \times 5C1$	0.495
3	3 long	$10C3$	0.264

$$\text{Total} = 15C3$$

⑤

X	Outcomes	# Outcomes	P(X)
2	(1,1)	1	1/36
3	(1,2), (2,1)	2	2/36
4	(1,3), (2,2), (3,1)	3	3/36
5	(1,4), ..., (4,1)	4	4/36
6	(1,5), ..., (5,1)	5	5/36
7	(1,6), ..., (6,1)	6	6/36
8	(2,6), ..., (6,2)	5	5/36
9	(3,6), ..., (6,3)	4	4/36
10	(4,6), (5,5), (6,4)	3	3/36
11	(5,6), (6,5)	2	2/36
12	(6,6)	1	1/36

Total = 36

⑥ Project A

X=Net Earnings	P(X)
1,180,000	0.35
-20,000	0.65

Project B

X=Net Earnings	P(X)
885,000	0.42
-15,000	0.58

⑦

Project A

$$E(X) = (1,180,000)(0.35) + (-20,000)(0.65) \\ = \$400,000$$

$$\sigma \approx \$572,364$$

Project B

$$E(X) = (885,000)(0.42) + (-15,000)(0.58) \\ = \$363,000$$

$$\sigma \approx \$444,203$$

- a) Project A has higher  $E(X)$   
↑  
expected net earnings
- b) Project B has a smaller value of  $\sigma$ .  
It would be less risky to pursue  
Project B than Project A.

⑧ Let  $X = \text{Profit} = \text{Investment Value} - \$20,000$

Strategy I: Buy Blue-chip Stocks

X	P(X)
5,000	0.6
-2,000	0.4

$$E(X) = 5,000(0.6) + (-2,000)(0.4) \\ = 2,200$$

Expected profit = \$2200

Strategy II: Buy Speculative Stocks

X	P(X)
10,000	0.6
-10,000	0.4

$$E(X) = 10,000(0.6) + (-10,000)(0.4) \\ = 2,000$$

Expected profit = \$2000

Based on expected profit, go with the blue-chip stocks.

⑨ We want to find  $P(X=0)$ ,  $P(X=1)$  and  $P(X=2)$ .

$$P(X=0) + P(X=1) + P(X=2) = 1$$

$$P(X=0) + 0.4P(X=0) + 0.2P(X=0) = 1$$

$$1.6 P(X=0) = 1$$

$$P(X=0) = \frac{1}{1.6} = \frac{10}{16} = \frac{5}{8}$$

$$\text{Now } P(X=1) = 0.4 P(X=0)$$

$$= 0.4 \left(\frac{5}{8}\right)$$

$$= \frac{1}{4}$$

$$P(X=2) = 0.2 P(X=0)$$

$$= 0.2 \left(\frac{5}{8}\right)$$

$$= \frac{1}{8}$$

X	P(X)
0	$\frac{5}{8}$
1	$\frac{1}{4}$
2	$\frac{1}{8}$

⑩ a)  $E(X) = 0\left(\frac{5}{8}\right) + 1\left(\frac{1}{4}\right) + 2\left(\frac{1}{8}\right) = \frac{1}{2}$

b) From calculator  $\sigma \approx 0.707$